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26 SEP 1966

From: Commanding Officer, Naval Air Engineering Center, Phila., Pa. 19112  
To: Commander, Naval Air Systems Command (AIR 520331)

Subj: Assignment 65-49 Analytical Methods in Specifications; Optimization  
of - Report No. NAEC AML 2488 Analysis of Metallic Matte, Origin  
Unknown

Ref: (a) Private communication with H. W. Gilbert STIC, U. S. Navy, of  
11 July 1966

Encl: (1) Plate 1 - Physical Appearance of Sample

1. Under the authorization of the subject assignment, a sample of material, apparently metallic, was submitted by Dr. H. W. Gilbert of the Scientific and Technical Intelligence Center, U. S. Navy for identification and possible clues regarding its origin. In addition to the verbal report of the results obtained, it was subsequently requested by reference (a) that a written report be submitted.

2. The physical appearance of the sample as received was similar to a metallic sulfide matte and had a brass-like color. Plate 1 is a photo micrograph of a cross-section of the material in which stratifications are clearly defined. Alternate layers appear to be more metallic than the others.

3. The sample was further tested as follows:

(a) The specific gravity of the sample was determined and was found to be 4.76.

(b) The metallic composition was determined spectrographically to be:

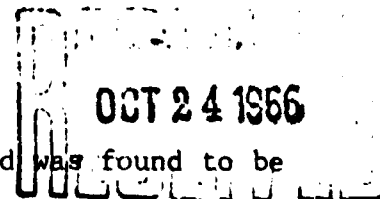
Major elements - Nickel, Cobalt

Trace elements - Iron, Manganese, Chromium, Silicon, Aluminum, Copper, Zinc

The density of the spectrographic lines indicated the nickel to cobalt ratio to be in the order of three to one.

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(c) Qualitative chemical analysis established sulfide as the major anion.

(d) Electron diffraction studies were made in an attempt to establish the origin of the material. Although the impurities present offered some interference to the electron diffraction patterns, evidence for presence of the following was obtained:

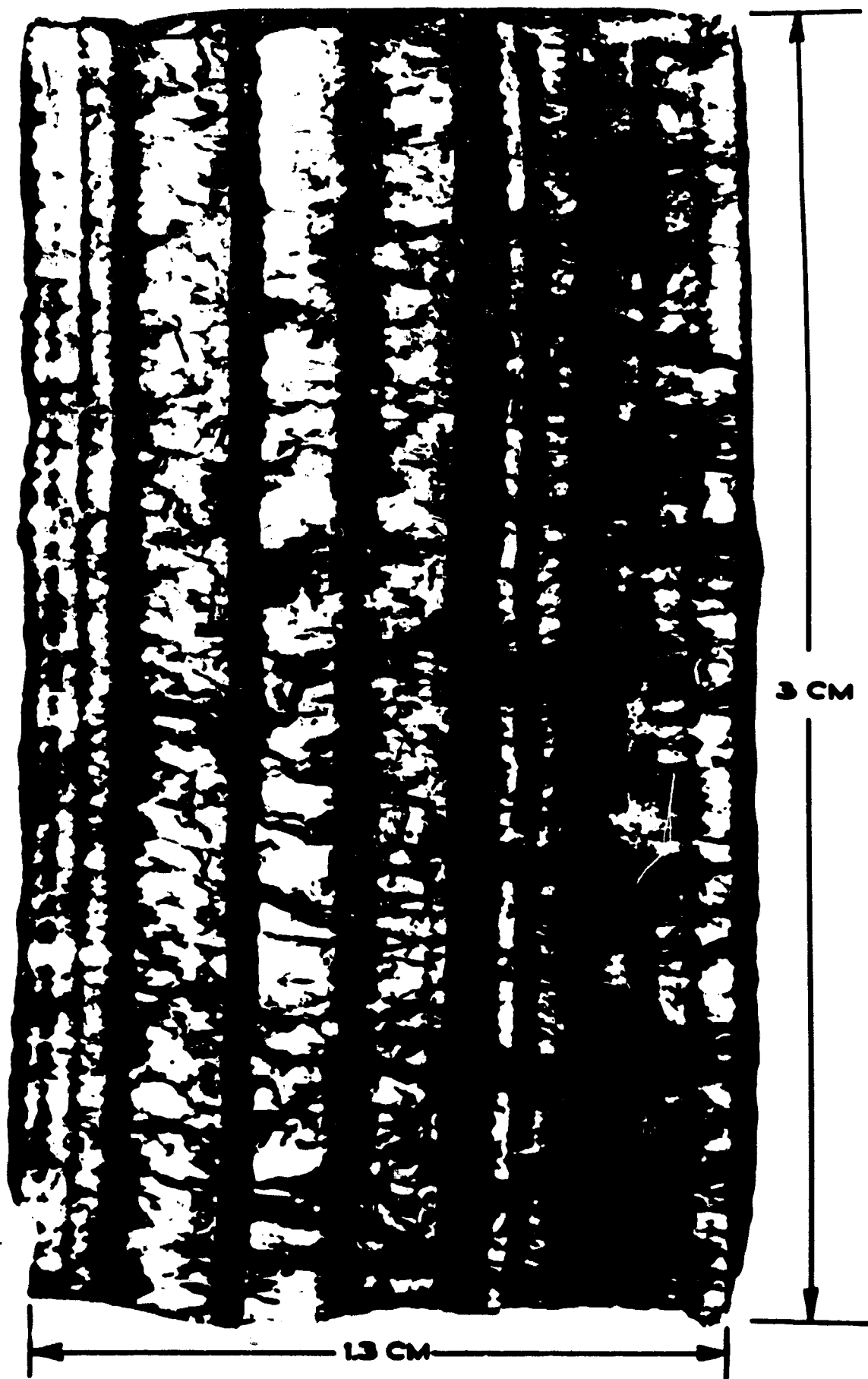
	<u>Likelihood of Presence</u>
NiS (Millerite)	Very good
NiS (Bunsenite)	Very good
CoS <sub>2</sub> (Cattierite)	Good
CoNiO <sub>2</sub> (Cobalt-Nickel-Oxide)	Good
NiCo <sub>3</sub> (Nickel Carbonate)	Good

4. Based on the spectrographic analysis, the electron diffraction studies, and the comparison of the specific gravity with that of materials reported in the literature, it is considered that the sample probably originated from a refining or smelting process for cobalt and nickel.

5. This is a partial report under the subject assignment which is being held open for additional investigations of a similar nature.

*F. S. Williams*  
F. S. WILLIAMS  
By direction

Copy to:  
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PHYSICAL APPEARANCE OF SAMPLE

## DOCUMENT CONTROL DATA - R&amp;D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

<b>1. ORIGINATING ACTIVITY (Corporate author)</b> ✓ Naval Air Engineering Center Aeronautical Materials Laboratory Philadelphia, Pa. 19112		<b>2a. REPORT SECURITY CLASSIFICATION</b> Unclassified	
		<b>2b. GROUP</b>	
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<b>4. DESCRIPTIVE NOTES (Type of report and inclusive dates)</b> Partial report			
<b>5. AUTHOR(S) (Last name, first name, initial)</b> Wright, E. R.			
<b>6. REPORT DATE</b> September 1966		<b>7a. TOTAL NO. OF PAGES</b> 2	<b>7b. NO. OF REFS</b> 1
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<b>d.</b>			
<b>10. AVAILABILITY/LIMITATION NOTICES</b> Distribution of this document is unlimited			
<b>11. SUPPLEMENTARY NOTES</b>		<b>12. SPONSORING MILITARY ACTIVITY</b> Naval Air Systems Command Department of the Navy Washington, D. C. 20360	
<b>13. ABSTRACT</b>  A sample of material, submitted by Dr. H. W. Gilbert of the Scientific and Technical Intelligence Center, U. S. Navy, was examined for identification and possible clues regarding its origin.  Based on the spectrographic analysis, the electron diffraction studies, and the comparison of the specific gravity with that of materials reported in the literature, it is considered that the sample probably originated from a refining or smelting process for cobalt and nickel.			

## Security Classification

14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Metallic Sulfide						

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